

THE DEVELOPMENT OF THE PHONOGRAPH
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By

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The world was startled by the optimistic prophecies of the scientific reviewers of 1878. The possibility of capturing sound with Mr. Edison's new machine was now a reality. One writer pointed out the startling idea of rehearing the voices of the dead through this device

and there is no doubt that its capabilities are fully equal to other results just as astonishing. When it becomes possible, as it doubtless will, to magnify sound, the voices of such singers as Parepa and Titiens will not die with them, but will remain as long as the metal in which they are imbedded will last..... It is already possible by ingenious optical contrivances to throw stereoscopic photographs of people on screens in full view of an audience; add the talking phonograph to counterfeit their voices, and it would be difficult to carry the illusion of real presence much further.¹

Thomas Alva Edison, already famous, increased his reputation greatly by this invention. In a May, 1878, article in the North American Review he saw use for the phonograph in letterwriting, dictation, talking books, spelling pronunciation in

education, reproduction of music, family records, music boxes and toys, clocks that speak the time of day, and recording telephone conversations.²

His phonograph of 1877 consisted of a brass drum on which a sheet of tinfoil was placed. The record grooves were made by a steel needle that was connected to a diaphragm and which indented the tinfoil as the drum was revolved by hand.³ At best this tinfoil record was a crude affair. The reproduction was feeble and indistinct, and the cylinders could be played only a few times before they wore out.⁴ However, Edison claimed that they were good for fifty to one hundred repetitions which to his mind was permanent "enough for all practical purposes."⁵

Although the machine was very imperfect, because of its novelty there was an immediate demand for public exhibitions.⁶ Throughout 1878 the phonograph continued to amaze thousands of people. But when the novelty wore off, public interest died, and the machine was thought of merely as

a scientific toy.⁷

For the next ten years progress was slow, for at this time Edison was busy perfecting his electric light.⁸ Furthermore, the use of tinfoil as a recording medium prevented any rapid developments.⁹ Nevertheless, Edison had not completely neglected his invention, and definite improvements were being made by others. The greatest progress was made by Charles Sumner Tainter, Chichester Bell, and his brother Alexander Graham Bell.¹⁰ In 1886 these men brought out their patent for a machine they called the Graphophone.¹¹ The great difference between this and the earlier machine was that a wax record was used and the record grooves were cut rather than indented.¹² It must be remembered in both these cylinder machines that the grooves were of the "hill and dale" variety. In other words, the grooves had different depths, depending upon the intensity of the sound recorded.¹³

Edison immediately sued the Bell and Tainter

interest when he found out about their patent. Fearing that he might be cut out of the future of this invention in which he had pioneered, Edison attacked them by claiming that cutting the record groove is essentially the same as indenting it. Charging Bell and Tainter with patent infringement, he started a law suit that dragged on interminably until each of the participants settled the issue by paying the other one dollar.¹⁴ The patents were shared by the temporary formation of a wary combine.¹⁵

While this case dragged on, Edison again began to work in earnest on his cylinder machine. He was wise enough to adopt the wax record that Bell and Tainter had developed. In 1888 he was able to announce his "perfected phonograph" which was capable "not merely of recording, but of reproducing, every kind of sound with which we are acquainted, including articulate speech,

with a fidelity little short of perfection."¹⁶

With the change to wax records, Edison had a cylinder that could be reproduced over three thousand times. A constant speed of cylinder rotation was assured by the use of a battery driven electric motor which, although cumbersome, was efficient.¹⁷ The greatest drawback was that the cylinders had to be listened to through rubber ear tubes.¹⁸ Edison nevertheless was so optimistic over his machines that he constructed a special factory for their manufacture.¹⁹

By 1888 then both the Phonograph and the Graphophone were developed to the point where commercial exploitation was possible on a small scale. As early as 1889, the Columbia Phonograph Company, licensed under the Edison and Bell-Tainter combine, was selling cylinders and machines in the District of Columbia, Delaware, and Maryland.²⁰ Manufacturers under the different patents evidently produced cylinders of varying

diameters, for in the June, 1892, issue of Music an interesting comparison between Graphophone and Phonograph records appeared. The author complained of the hissing sound of the Bell and Tainter cylinder, and praised the larger and more perfect product of the Edison laboratory.²¹

The year 1887 brought an entirely new development into the art of reproducing sound. At this time Emile Berliner, who had already become famous because of his successful telephone transmitter,²² invented a means of recording on a disc. On May 16 of that year he applied for his first patent, and a year later, he exhibited his machine at the Franklin Institute.²³ It is important to note that this was the first machine not to use hill and dale grooves on the record. The patent specified that a groove be cut of constant depth.²⁴ Therefore the sound vibrations imbedded in the record were of the

lateral type used by all companies today. Berliner cut his early records by coating a polished zinc disc with a most fat. The recording cut through the wax to the zinc plate. The plate was then immersed in acid, and the record grooves were etched to a definite depth.²⁵

There were several very distinct advantages to Berliner's Gramophone. The records were easy to store. Those who owned cylinder machines had to buy immense cabinets to keep their records in. Furthermore, the disc record was the only one which had the reproducing head propelled along the grooves by the grooves themselves.²⁶ The cylinder machines all needed special screw gears to carry the sound box across the record. These easily went out of order. But the most important advantage that the disc record had **was** the only successful method of duplicating records.²⁷ As early as the time of the Franklin Institute demonstration, Berliner had a crude means of

reproducing his records. However, by the early 1890's, all the technical details of pressing the records had been ironed out, and all copies were practically as good as the original. This made possible the mass production of hard rubber records. It is amusing to note the optimistic spirit of a reviewer in an 1891 issue of the Scientific American about a new duplicating process:

We may then have dinner sets, the dessert plates of which have gramophone records pressed in them, and which will furnish the after dinner entertainment when the repast is over.²⁸

The effect of the ease of duplication can be seen when it is compared with the cylinder production of the period. Whereas Berliner was pressing practically unlimited quantities of discs when he began manufacturing in 1895,²⁹ five years later a feature article in the Scientific American described the production of cylinder records at the Edison factory.³⁰

The inventor had still not developed a satisfactory means of duplicating records, and mass production was accomplished by lining up rows of recording machines in front of the artists. The author of this article says that when he visited the factory a band was playing to sixteen recording machines. In order to produce 1120 records the artists would have to repeat themselves seventy times.³¹ The development of a cylinder duplicating process gave the industry a great improvement, but no method could equal the simple stamping of records from a metal matrix that Berliner controlled.³²

More than duplication of records was necessary before the phonograph could enter the common home. Until 1894 only hand driven or clumsy electrical or water driven phonographs were available.³³ A low-priced motor was needed for the public. This problem was solved in that year by T. H. MacDonald of the American Graphophone Company who produced

a clockwork motor for cylinder machines.³⁴

Between 1895 and 1897 Eldridge R. Johnson developed a cheap and efficient clockwork motor for the disc machines of Berliner.³⁵

With the clockwork motor and the mass production of records, the cylinder and disc companies entered a struggle that doomed the cylinder record to eventual oblivion. Berliner advertised in 1896 his spring driven Gramophone with a tin amplifying horn and two records for twenty-five dollars. Records were sixty cents each for seven-inch discs.³⁶ Although Berliner claimed that these records embraced almost any sound, by present standards these early discs were extremely primitive.³⁷ The surface noise is very bad, and they have a very unnatural tone.

Despite the advent of the disc record, the last half of the nineties was the heyday of the cylinder phonograph. Automatic phono-

graph parlors sprang up everywhere in the United States.³⁸ These had existed earlier, but they became extremely popular at this time, and did much to help sell the cylinders. New developments aided the showmen of the time to go along with this craze. One of the most popular was the Multiplex phonograph which was manufactured for commercial exhibition. It featured five cylinder racks that could be interchanged quickly by a rotating device. Three sets of ear tubes came with the machine so that the customers could hear the records.³⁹

With this advertisement in the amusement parlors of America, it is no wonder that the cylinder phonograph gained a lead over the disc machine. In July, 1896, Edison announced a new playback phonograph complete with ear tubes for the home.⁴⁰ It was not till the next year, however, that the first cheap, practical cylinder phonograph was available for the public. This

machine, the Eagle Graphophone, was advertised with a clockwork motor and a tin amplifying horn for the then amazingly low price of ten dollars. Records sold for five dollars a dozen.⁴¹

Before 1901, the important patents were in the hands of Berliner, Edison, American Graphophone, and Columbia. The powerful Columbia Phonograph Company had rights to both the Edison and Graphophone patents. They realized the importance of the rapidly growing disc business, so they gained control of a well-worded patent for recording an even depth sound line on a disc that sidestepped Berliner's patent. A lawsuit between Berliner and Columbia threatened to bring a close to the flat disc business in America, but, nevertheless, the records continued to be manufactured and sold throughout 1900 and 1901. In the latter year Eldridge R. Johnson of the newly-formed Victor company got the litigants

together and they all pooled their patents. Berliner gave up the sound box guided by an even depth groove, American Graphophone gave up wax as a recording medium, and Columbia gave up a stylus vibrating laterally and engraving an even depth groove.⁴² The importance of this action was the Victor Company, successor to the Berliner Company, was now able to make recordings on wax rather than the old film-covered zinc plate. This resulted in records with much greater tonal quality.

The cylinder business died a slow death, and the manufacture of these records did not finally cease in this country until the Edison Phonograph Company went out of business in 1929. Continually striving to improve his product, Edison replaced his standard two-minute wax cylinders with four-minute "blue amberols" which were made from a celluloid compound. As this business was netting an annual seven million

dollars around 1910, he was naturally reluctant to leave this field where he had no competition.⁴³ Nevertheless, even Edison had to develop a disc record by 1911. This "Diamond Disc Re-Creation" was doubtless the finest record developed during the acoustic era. Although the Edison product was cumbersome (each record was one-third of an inch thick) and the records had to be played on a special machine, the superiority of the recording technique skyrocketed sales until Edison was running a close third behind Victor and Columbia between 1916 and 1922.

The phonograph was very rapidly popularized in the homes of America after the turn of the century. A 1907 article on the new trade states that "retailers engaged in the sale of machines and records are counted by the thousands while private buyers number millions."⁴⁴ There are several reasons for

this rapid increase in sales. The records themselves were improved during these years. Much surface noise was eliminated and more natural reproduction was developed.⁴⁵ Volume was increased by a change from the earlier small tin horn amplifier to an immense wooden horn.⁴⁶

Just a few years before, in 1899, Berliner was able to get volume from his small machine only by lining up six Gramophones and simultaneously playing six of the same records.⁴⁷ Reproduction was kept free from distortion by the development of the tapering tone arm in 1903 which held the sound box.⁴⁸ Motor springs were introduced that allowed the turntable to be played for longer and longer periods without rewinding. In 1908 the double-sided **disc** record was introduced. On a sample advertising record Columbia built up its new process by promising "double value, double wear, double everything but price."⁴⁹

The prosperity of the phonograph companies

brought about their means of capturing the top entertainment of the day. One has only to look at the records of the period to recognize names that are still familiar.

In the popular field George M. Cohan, Montgomery and Stone, Harry Lauder, Blanche Ring, Norworth and Bayes, and Weber and Fields were all recording before 1913.

Early in the century Victor started its famous Red Seal series and other companies quickly followed suit. Victor's European associates signed up the young Italian tenor Enrico Caruso in 1902, and the aging Adelina Patti began recording three years later.⁵⁰ Even presidential candidates turned to the phonograph as a means of reaching the people. In 1908 Taft and Bryan recorded their views indiscriminately for all companies. Four years later Victor issued a special group of nine records including three by each major

candidate, Taft, Roosevelt and Wilson, discussing his platform.

By the time of the first World War, therefore, Victor, Columbia, and Edison had developed into large and very prosperous firms. The War itself had an effect of bringing even greater prosperity to an already booming business. The phonograph was the only convenient means of supplying the soldiers' need for music. A reviewer stated that "French life evolved phonograph fans by the hundred thousands."⁵² The records and machines were kept by the soldiers with an almost religious reverence. Vivian Burnett founded the National Phonograph Records Recruiting Corps in 1918.⁵³ The object of this organization was to find out the needs of the soldiers, collect, and then send the records to them. This promising organization unfortunately had its life cut short by the armistice.

The popularity of the phonograph during the

War paved the way for the great postwar record boom that lasted till 1922.⁵⁴ New companies sprang up everywhere to cash in on this wave of popularity. A few of them such as Brunswick, Aeolian-Vocalion, and Gennett were able to build up imposing organizations. During this period the forerunner of the modern dropmatic system of playing records was invented but not popularized.⁵⁵

During 1922, however, the radio began to emerge from its classification as a scientific curiosity. In that year a prominent radio magazine stated frankly that it realized the important position of the phonograph, and that it did not expect the radio to equal this popularity for some time.⁵⁶ Two years later a reviewer in the Literary Digest recognized the importance of both the phonograph and the radio. He

predicted "considerably in the future" the combination of the phonograph and radio industries.⁵⁷

Despite this talk of mutual interest, the popularity of the radio grew rapidly. The years 1924 and 1925 witnessed a serious depression in the industry.⁵⁸ Only Brunswick managed to increase its sales at this time. It was able to do this because it had put on the market a combination radio-phonograph.

This industry-wide depression was countered by the introduction of electrical recording. The revolutionary process was developed in 1925. Earlier experiments had been made with recording from telephone transmitters as early as 1904, but the discoveries of 1925 were the first that were practical.⁵⁹ The method was derived from a thorough study of telephone circuits.⁶⁰ Now it was possible to record the bass and higher harmonics. With electrical recording the range of audibility was doubled.⁶¹

It was a year or more before the advantages of this new discovery were fully realized. Although electrical recording was available, electrical reproduction was not. An attempt was made to adapt the old phonographs to playback for electrical records, but although the horn on the inside of the cabinet was lengthened to about six feet through ingenious curvature, it did not give the desired results and was immediately dropped when the first electrical reproduction was introduced.⁶²

By the end of 1927 there were few if any acoustic records being made, and the catalogs were rapidly dropping their older records.⁶³ Edison, however, clung to his "re-creative" style of recording. His organization had advertised for years that "There can NEVER be a better Phonograph."⁶⁴ With his business falling away, the great

inventor tried to stem the tide. Electrically recorded re-creations were attempted, but they failed to catch on with the public. A twelve-inch record was brought out that played twenty minutes to a side. The effort was not great enough, for these new records were too low in volume, had a tendency to jump the grooves, and were generally dubbings from older re-creations.⁶⁵ Finally, in an attempt to salvage the remnants of the business, the company brought out electrically recorded discs with a lateral groove to enter into the general record competition.⁶⁶ The effort was too late and the company abandoned its recording activities in November, 1929.

In the meantime the other firms soon followed Brunswick's early lead and began to ally themselves with radio manufacturers so that the two could be sold as a unit.⁶⁷ Again business began to rise. The end of an era can be placed in the year 1928 when Eldridge R. Johnson of

Victor sold out for thirty million dollars. A year later the bankers sold the company to the Radio Corporation of America for a considerably larger sum.⁶⁸

The advent of the depression knocked the industry to a new low. The benefits of the new electrical recording could only be enjoyed with the purchase of a new electrical phonograph and new records. It was a luxury that many could not afford. The old phonographs and records were either stored in the attic or thrown away, and in the early thirties only ten million records a year crossed the counters.⁶⁹ RCA Victor tried to rejuvenate the sagging market in 1933 by marketing a long playing record. The need of a new and more expensive turntable that revolved at 33-1/3 revolutions per minute doomed this venture before it started.⁷⁰

A great demand for juke boxes in the

middle of the decade started the industry on a rapid comeback that gained tremendous momentum in the early forties. Although recording activities were occasionally interfered with by Petrillo's Union of Musicians, the actual effects were negligible to the volume of sales. In 1947, 325,000,000 discs were sold.⁷¹ The following year showed another serious slump in the business due largely to Petrillo's ban on recording which was far more effective in dropping sales than had been anticipated.

Again the companies rose to the challenge. In the summer of 1948 Columbia introduced a long playing record that revolved on a 33-1/3 rpm turntable, played up to forty-five minutes to a record, and pressed on the vinylite base that had been developed during the war. Eight months later officials of the company were able to announce that their long playing microgroove records had caught **the** public's fancy. Six

hundred thousand players had been bought and over 2,000,000 records sold.⁷² For those who were only interested in the equivalent of the standard ten- or twelve-inch 78 rpm records, Columbia introduced a seven-inch record which played on the long playing phonographs.

Victor countered this move by introducing a 6-7/8 inch record with a large center spindle that was to be played at 45 rpm on a special quick-changing reproducer. As this is written, all the elements for a record war are in the making. Capitol has lined up with Victor, while Mercury intends to follow the Columbia style of record.⁷³ Decca Records has not as yet committed itself. It is up to the public to decide whether to accept either of the new systems or cling to the standard recordings of 78 rpm which have proved satisfactory since the early days of the industry.

* * * * *

The phonograph is an American invention that was developed overnight from a scientific toy to a popular machine for reproducing music. The invention of a practical duplicating process and a dependable clock spring motor lowered the price enough to put it within the reach of everyone. Electrical recording saved the industry from oblivion in 1925, as did the juke box and the gradual return of prosperity in the late thirties. The first serious marketing of long playing records in 1948 posed a new problem which will be settled in the future.

Footnotes

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